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XIV. *The Characters of several Genera in the Natural Order of Coniferæ: with Remarks on their Stigmata, and Cotyledons.* By Richard Anthony Salisbury, Esq. F.R.S. and L.S.

Read April 2, 1805. 12

THE science of Botany does not consist so much in knowing a parcel of names and technical terms, as a great variety of immutable facts respecting Vegetables, all of which have more or less connection with each other, and which the philosophical student stores up to use, when he meets with what is new and strange: the detail of the following discovery therefore, if not entertaining, is at least so far important, that some curious analogies and differences occur in it.

Two years ago, when the author of that superb work on *Pinus*, the figures of which may be regarded as a national honour, showed me his manuscript, and asked my opinion respecting the fecundation of this genus, I was induced to examine several species with more care than usual, that I might, if possible, thoroughly understand it: but I could neither find any traces of a stigma in the female flower, nor any vestige of the insertion of the seeds in the receptacle, notwithstanding there appeared, as I then thought, a very evident cicatrix at the base of each seed, where it had been attached. For a fruit to be impregnated by the same channel in which it receives nourishment appeared so very extraordinary, that I resolved to watch a female flower from  
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the very first expansion of the bud: accordingly I climbed to the top of a *Cembra Pine* every morning for near a fortnight. In the mean while I remarked female flowers upon an old *Cypress*; and the moment I examined them, I then first suspected what proved to be the truth; namely, that each of the seeds in *Pinus* was impregnated separately, and that what I had hitherto supposed to be a cicatrix of their insertion in the receptacle, was in fact the remains of the true stigma. About a week afterwards I was highly gratified with the most clear and full view of this process in the *Cembra Pine*. The little squamæ of the future fruit with their dorsal bractæ are at that period all quite separate from each other, and horizontally arched, as if to protect the long crimson stigmata which project out in the vacant interstices: but as soon as ever impregnation takes place, the bractæ and squamæ change their direction, and become closely imbricated, immediately assuming the appearance of a *Strobilus*. In the *Spruce Fir* this circumstance takes place so rapidly that the lower squamæ become quite erect, while the upper ones are still arched. The next species I examined was the *Scotch Fir*, then the *Balm of Gilead Fir*, *Silver Fir*, *Pinaster* and *Weymouth Pine*, in all which the structure of the stigma differs very little: that of the *Larch*, on the contrary, I found the following year had no resemblance in figure to the others; it comes much nearer the stigma of *Cupressus*, and consists entirely of a thick pubescence at first convex, but finally concave, and not unlike a bird's nest in miniature.

I believe the stigma in this genus has never before been described: some vestiges of it, however, have been faithfully represented by Mr. Ferdinand Bauer in his dissections of the *Spruce Fir* and *Virginian Pine*: also by Gleichen in those of the *Scotch Fir*. The last author, nevertheless, supposes fecundation to take place

place by the squamæ, as will appear from his own words. “*La fleur femelle est composée de plusieurs ecailles sur les quelles il y a des pointes rouges en forme de griffes. A l'autre extrémité inférieure de ces on remarque au cote extérieur des ecailles une éminence en forme de levres d'un rouge clair. Comme j'ai observé sur ces levres plusieurs vesicules et glandules, je les prens pour le mammelon, ou l'orifice du conduit de germe, à quoi elles me semblent être beaucoup plus propres que les pointes rouges en forme de griffes, qui sont dures et seches.*” Respecting these vesicles and glands I have only to observe, that the former are nothing but pollen, which is discharged in great abundance over every part of the flower, and the latter the proper pubescence of the squamæ. No botanist appears to have attended to this subject except Jussieu, who, probably having observed the stigmata only after fecundation, describes them as glands, and, with that diffidence which is so often the concomitant of deep learning, then inquires whether the squamæ dorsales ought not rather to be considered as styles, and the squamæ interiores as germina in the Linnæan sense of the term. This question it is presumed is now fully answered.

It has been remarked by our President, that the errors of eminent writers are alone worth pointing out; it becomes therefore here necessary to notice what I conceive to be a fundamental mistake in the great man above mentioned, respecting the cotyledons of *Pinus*; more especially as he is implicitly copied by Michaux, Poiret, and Ventenat. Nay, the last author has gone so far as to make Redouté draw the figure after Jussieu's description, instead of the object before him, as Miller did more than once in his Illustration of the Sexual System. The draughtsmen whom we are all so proud to number as fellows of this society, will, I trust, never suffer any authority, however great or powerful, to mislead them in this manner. Jussieu says in his observations

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at the end of Coniferæ, “*Semen vere bilobum extat, scissura duplici opposita profundiore lobos definiente; sed iidem in germinatione partiti et radiatim patentes divisuris linearibus verticillum mentiuntur polyphyllum involucro umbellifero æmulum, unde quædam Coniferæ, et præcipue Pinus, polycotyledones dicuntur.*” I have examined with the most scrupulous nicety the embryos of the *Norway Spruce Fir*, *Black Spruce*, *Silver Fir*, *Balm of Gilead Fir*, *Scotch Fir*, *Larch*, and *Cedar of Libanus*, both before and after germination, without ever being able to find two opposite divisions deeper than the rest: so that there is not the smallest doubt they are truly polycotyledonous. The number of cotyledons, moreover, is by no means constant, even in the same species, and they approach the succeeding leaves in structure much nearer than any we are yet acquainted with, being, like them, biennial.

Having now found a sufficient character in the flower of *Larix*, to distinguish it from *Abies* and *Pinus*; being also favoured by the liberality of Sir Joseph Banks with specimens of the *Chinese Fir*, the *Chili Pine*, the *Norfolk Island Pine*, and that still more curious tree the *Dammar* of Amboina, which he long since pointed out to me in Rumphius’s work, as being a true *Conifera*, I shall finish this paper with the characters of all these seven Genera.

CONIFERÆ. *Juss.*

Sect. 2. *Pericarpia obversa, nec ut in Cupresso erecta, juxta basin squamarum stigmatigera.*

AGATHIS.

Masc. Squamæ crassæ, in Amentum ovale imbricatæ. Anthera multilocularis. Fœm. Squamæ in Strobilum magnitudine ovi anserini subrotundum imbricatæ, dorso nudæ nec bracteatae,

bracteatae, superne incrassatae, persistentes, monogynae. Pericarpium lateri interiori squamæ adnatum, margine alatum, durum, strobilo dehiscente deciduum. Embryo 2-cotyledoneus. *Arbor excelsa, resiniflua, a reliquis facie abludens: ramis oppositis sparsisque: ramulis subancipitibus. Gemmæ hinc inde supra axillares terminalesque, caryophylli figurâ. Folia opposita vel subopposita, 1½—3 pollices longa, 1 pollicem lata, interdum angustiora, ovali-lanceolata, integerrima nervis parallelis. Flores ramulis lateralibus terminales.*

Nomen dixi ab *αγαθὺς* *glomus*; floribus in glomos collectis.

*loranthi-* Folia breviter petiolata laminis ovali-lanceolatis, obtusis.  
*folia.*

Tab. XV.

*Pinus Dammara.* *Lamb. Pin. p. 61. t. 38.* *Arbor javanensis Visci foliis &c. Raij Hist. v. 3. Dendr. p. 130. auctoritate Herbarii Sherardiani.*

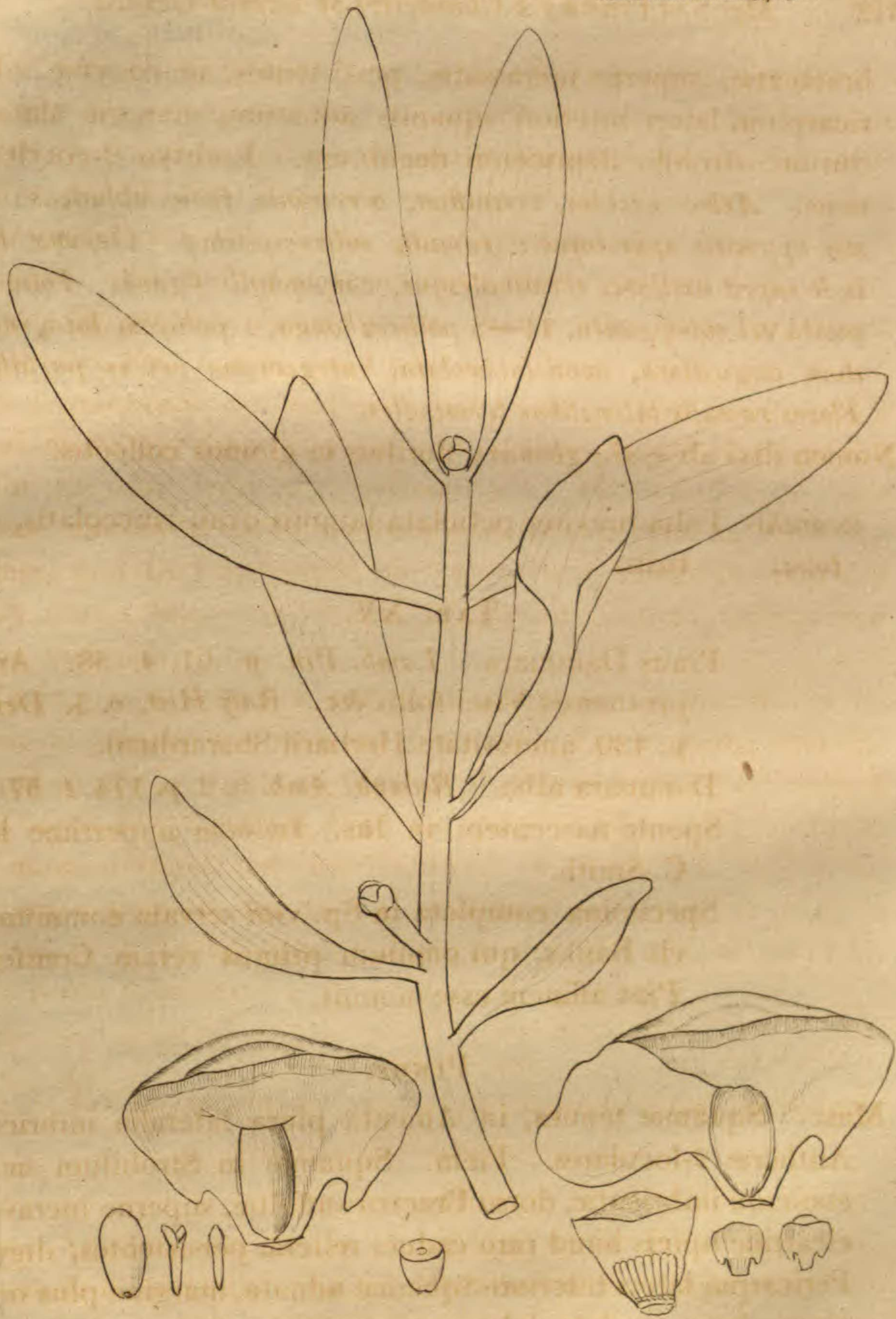
*Dammara alba.* *Rumph. Amb. v. 2. p. 174. t. 57.*

Sponte nascentem in Ins. *Amboina* nuperrime legit C. Smith.

Specimina completa in Sp. vini servata communicavit Banks, qui omnium primus veram Coniferam *Pino* affinem esse monuit.

PINUS.

Masc. Squamæ tenues, in Amenta plura lateralia imbricatae. Antheræ 2-loculares. Fœm. Squamæ in Strobilum sæpius conicum imbricatae, dorso Bracteâ suffultæ, superne incrassatae cicatrice apicis haud raro caduci relictâ, persistentes, digynae. Pericarpia lateri interiori Squamæ adnata, margine plus minus alata, dura, strobilo dehiscente decidua. Stigma 2—3-fidum  
laciniis



*Agathis loranthifolia.*

R.A. Salisbury del.

laciniis caudatis. Embryo 4—8-cotyledoneus. *Arbores quarum plures excelsæ, conicæ: ramis verticillatis: ramulis cylindræis, interdum sparsis. Gemmæ grandes. Foliâ 2—5, in fasciculis alternis vaginâ basi cinctis ramos undique vestientibus, acerosa et interdum longissima, biennia. Antheræ in Pino, Abiete, et Larice, ex analogiâ potius solitariae et 2-loculares mihi videntur quam binæ et 1-loculares.*

Nomen antiquum: a  $\pi\iota\omega\upsilon$  pinguis, quia abundat resinâ, derivatum vult Schrevelins.

\* *Folia gemina.*

*sylvestris.* Folia 2-pollicaria. Strobili conici, squamarum exteriorum apicibus præcipue inferioribus valde pyramidatis. Antherarum squama vix cristata.

*P. sylvestris.* *Lamb. Pin. p. 1. t. 1.* cum pluribus notissimis speciebus.

LARIX.

Masc. Squamæ tenues in Amentum terminale imbricatæ. Antheræ 2-loculares. Fœm. Squamæ in Strobilum subrotundum imbricatæ, dorso Bracteâ suffultæ, superne attenuatæ, persistentes, digynæ. Pericarpia lateri interiori Squamæ adnata, margine alata, dura, strobilo dehiscente decidua. Stigma hemisphæricum disco mox cavo, glanduloso-pubescens. Embryo 5—9-cotyledoneus. *Arbores excelsæ, pyramidales: ramis alternis, longe attenuatis, caudatis: ramellulis incrassatis, brevissimis. Gemmæ parvæ nec ut in Pino et Abiete tumidæ. Folia alterna; in ramellulis circulo annotino densissima fasciculum simulantia; acerosa, annua vel biennia. Flores ramellulis lateralibus terminales.*

Nomen antiquum Græcum: a  $\lambda\alpha$  valde,  $\rho\acute{\epsilon}\omega$  fluo, derivarem, ob balsamum terebinthinum.

\* *Folia annua, autumnno decidua.*

*pyramidalis.* Strobili pollicares, anguste ovati; squamis margine patulis repandisque. Bracteæ panduræformes.

*Pinus Larix.* *Lamb. Pin. p. 53. t. 35.* incomparabilis ut pene omnes. *Pinus Larix. Linn. Sp. Pl. ed. 2. p. 1420.* *Larix decidua. Mill. Dict. ed. 7. n. 1.*

*pendula.* Strobili vix pollicares, oblongi; squamis margine incurvis, obtusis. Bracteæ panduræformes.

*Pinus pendula. Lamb. Pin. p. 56. t. 36.* *Pinus pendula. Soland. in Ait. Hort. Kew. v. 3. p. 369.*

Sponte nascentem in *Canada* montibus frigidis, legit *G. Bartram.*

*tenuifolia.* Strobili semipollicares, ovales; squamis margine incurvis obtusis. Bracteæ ovales.

*Pinus microcarpa. Lamb. Pin. p. 58. t. 37.* *Pinus laricina. Du Roi Harb. ed. Pott. v. 2. p. 117.*

Sponte nascentem in *Canada*, legit *G. Bartram.*

\* *Folia 2-ennia, vere decidua.*

*patula.* Strobili tripollicares, late ovales; squamis margine erectis, truncatis. Bracteæ in fructu evanidæ.

*Pinus Cedrus. Linn. Sp. Pl. ed. 2. p. 1420.* *Cedrus foliis &c. Trew Ehret. p. 1. et 28. t. 1. 60, 61.*

Flores fœmineos diu post anthesin tantum vidi: an Stigma præcedentium?

## ABIES.

Omnia ut in *Larice* præter Habitum et Stigma: in hoc *Pino* convenit, foliis autem solitariis et strobilorum squamis superne attenuatis facile dignoscendum genus. Stigma 2—3-fidum laciniis



ciniis caudatis. Embryo 3—9-cotyledoneus. *Arbores excelsæ, conicæ, pyramidales vel etiam pendulæ; ramis alternis aut verticillatis, cylindræis. Gemmæ grandes. Folia alterna, in ramis lateralibus disticha, vix acerosa, sæpius nonnihil dilatata, biennia. Flores ramulis terminales.*

Nomen antiquum : a voce  $\alpha\epsilon\iota\omicron\varsigma$  *robustus*, legitimum reddam, ligno in multis valido.

\* *Folia tetragona.*

*excelsa.* Strobili digitiformes; squamis rhombeis, retusis. Bracteæ minutæ.

*Pinus Abies.* *Lamb. Pin. p. 37. t. 25. P. Abies. Linn. Sp. Pl. ed. 2. p. 1421. A. Picea. Mill. Dict. ed. 7. n. 2. A. foliis &c. Linn. Fl. Lapp. p. 341.*

*curvifolia.* Strobili anguste conici: squamis obovatis, integerrimis. Bracteæ minutæ.

*Pinus alba.* *Lamb. Pin. p. 39. t. 26. Pinus laxa. Ehr. Beitr. v. 3. p. 24. Pinus canadensis. Wang. Beytr. 5. t. 1. f. 2.*

Sponte nascentem in *Canada*, legit *J. Bartram*.

Alias species vide in opere Lambertiano.

BELIS.

*Masc.* Squamæ tenues, in Amentum parvum gemmiforme imbricatæ. Antheræ 2-loculares. Fœm. Squamæ in Strobilum lupuliformem imbricatæ, brevissimæ margine cristato, dorso Bracteâ multo ampliore et acutâ suffultæ, persistentes, 3-gynæ. Pericarpia lateri interiori squamæ adnata, duo auricularia, medium cuneiforme, vix alata, dura, strobilo dehiscente decidua. Stigma et Embryonem nondum vidi. *Arbor sinensis re-*

*siniflua*: ramis subverticillatis sparsisque. Folia alterna, sessilia, anguste lanceolato-cuneata, serrulata, pungentia. Flores terminales, feminei in ramellulis lateralibus.

Nomen dixi a figura Herbæ: βελος *jaculum*.

*jacutifolia*. Folia deflexa, subtus glauca.

Pinus lanceolata. *Lamb. Pin. p. 34. t. 28.* Abies major sinensis &c. *Pluken. Amalth. Bot. 1. t. 351. f. 1.*

Sponte nascentem in *Chekiangh*, legit G. L. Staunton, Baronettus.

#### EUTASSA.

Masc. non vidi. Fœm. Squamæ in Strobilum globosum imbricatæ, dorso Bracteâ longiore fere totæ connatæ, post florentiam valde ampliata, obcuneatæ, lateribus alatis samari-formes, lignosæ, deciduæ, monogynæ. Pericarpium inter squamam bracteamque immersum et conforme. Embryo cotyledonibus 4, pollicem longis, Loranthi folium referentibus. *Arbor ad 200 pedes pyramidalis, sempervirens, heterophylla: dum junior facie Abietum ramis verticillatis, foliisque verticalibus acerosis; postea Gnidiis vel Proteis quibusdam similior, ramis tunc sparsis, foliisque rectis dense imbricatis, ovatis. Flores terminales.*

Nomen a ramis foliisque quasi artificiose collocatis: εὐ bene, τασσω *ordino*.

*heterophylla*. Folia ramorum juniorum divaricata, valde falcata.

Sponte nascentem in Insula *Norfolk*, legit P. G. King.

Strobilus magnitudine pugni, apice bractearum cuneato persistente exasperatus. Specimina in Insula